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**N D Design**

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(51) INT CL<sup>7</sup>

**G01D 5/34**

(52) UK CL (Edition S )

**G1A AA3 AA7 AEW AR7 AT20 AT26 AT3**

(56) Documents Cited

|                     |                     |                     |
|---------------------|---------------------|---------------------|
| <b>GB 2245973 A</b> | <b>GB 2173898 A</b> | <b>US 5420413 A</b> |
| <b>US 5386291 A</b> | <b>US 5376785 A</b> | <b>US 5329114 A</b> |
| <b>US 5017771 A</b> | <b>US 4572607 A</b> |                     |

(58) Field of Search

**UK CL (Edition S ) G1A**

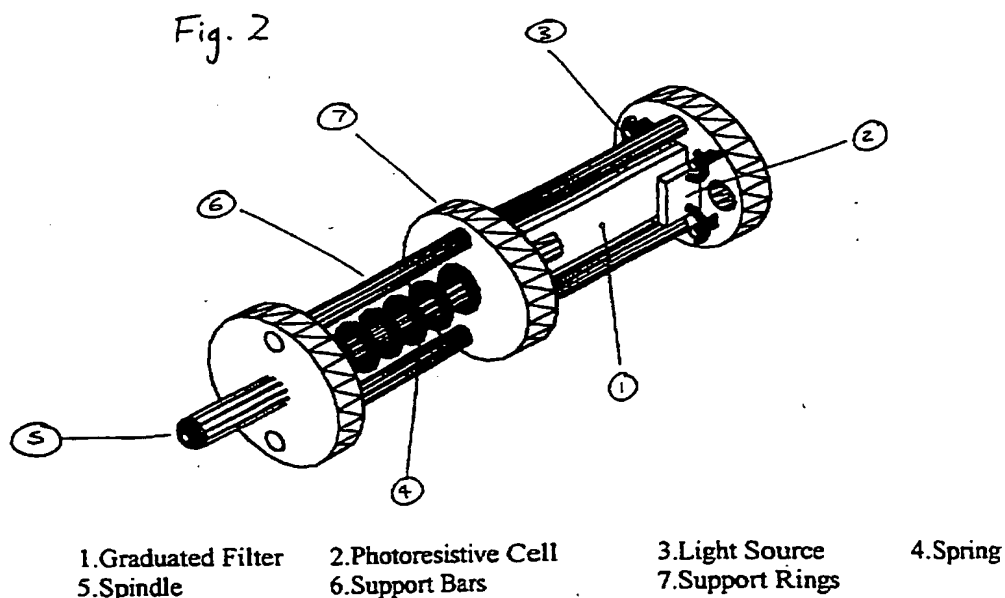
**INT CL<sup>7</sup> G01D 5/32 5/34**

**Online: WPI, EPODOC, JAPIO**

(54) Abstract Title

**Linear optical transducer**

(57) A linear optical transducer comprises a graduated filter (1) mounted on top of a spindle (5). When the spindle is subjected to any pressure, the graduated filter will pass between a light source (3) and a photoresistive cell (2). As the light intensity changes, the photoresistive cell will register a change of resistance. This will register as an increase or decrease in ohms on an analogue or digital meter. A spring (4) is fitted inside a stainless steel tube around the spindle (5) and supplies a positive pressure to the movement of the transducer. The spindle may be placed in contact with a surface to monitor displacement of the surface. The transducer may be made of stainless steel and plastic to withstand exposure to the elements, and have a high temperature cable fitted.



The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

At least one of these pages has been prepared from an original which was unsuitable for direct photoreproduction.

GB 2 361 764 A

Fig. 1

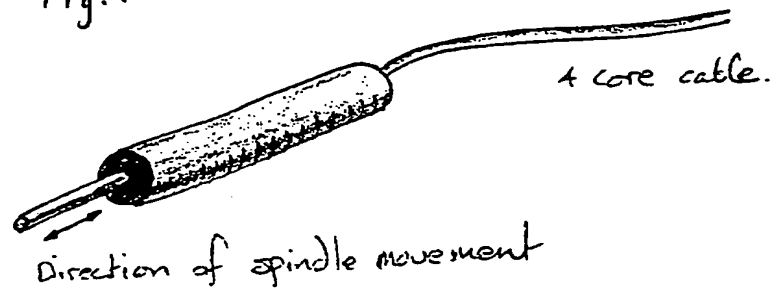
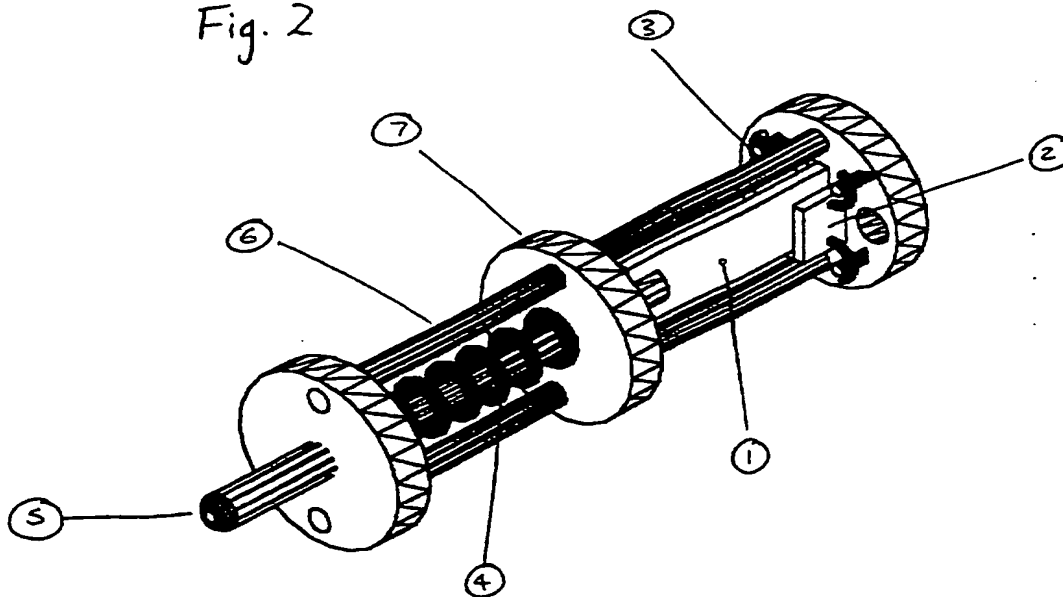


Fig. 2

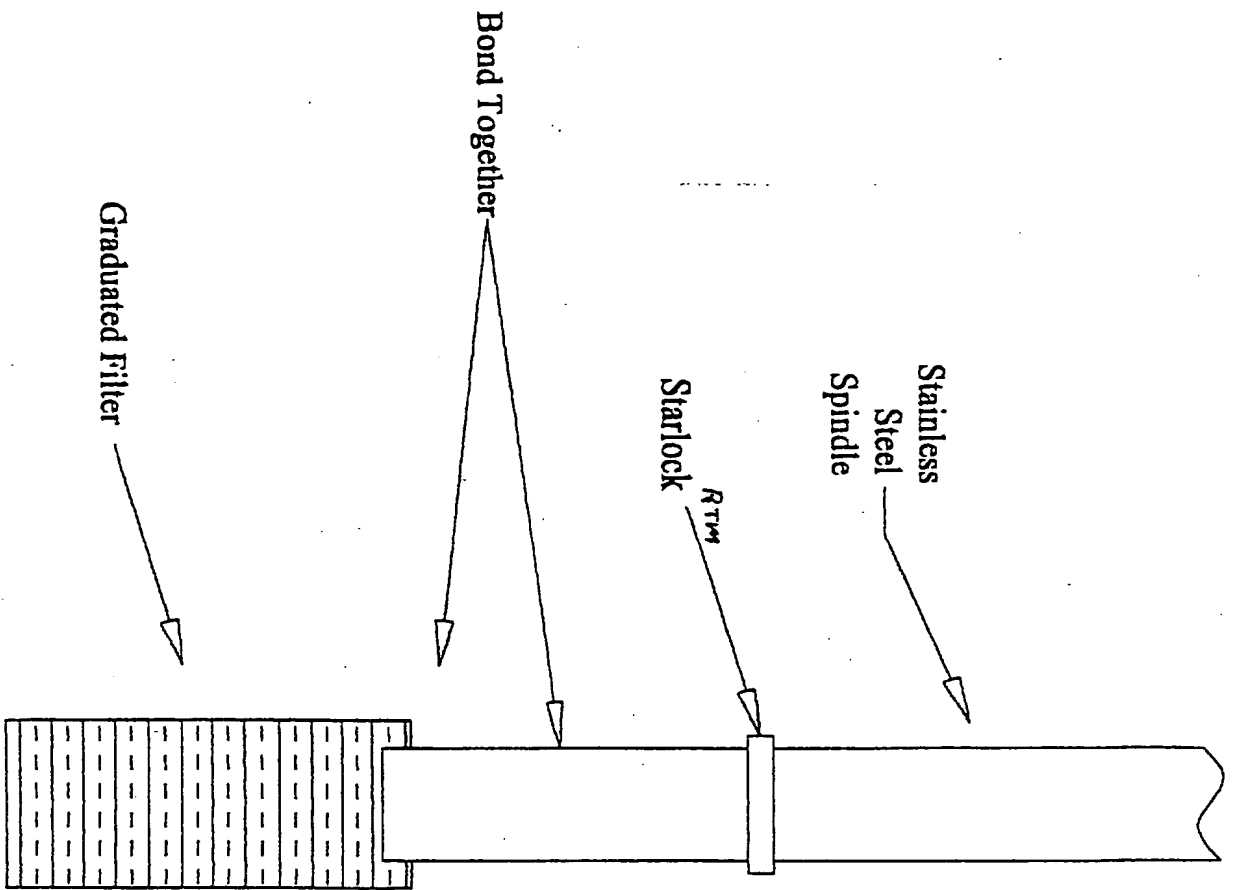


1. Graduated Filter  
5. Spindle

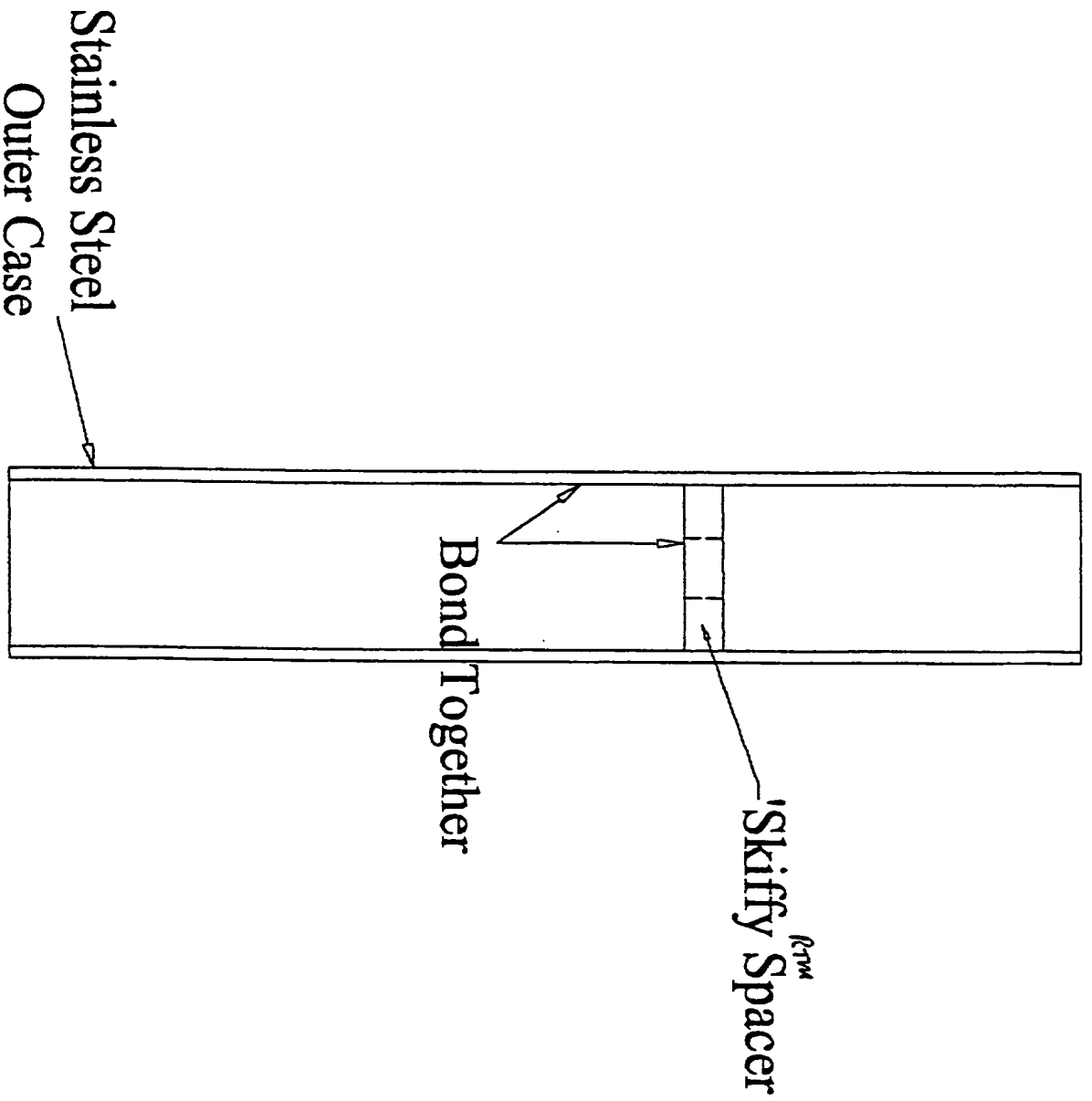
2. Photoresistive Cell  
6. Support Bars

3. Light Source  
7. Support Rings

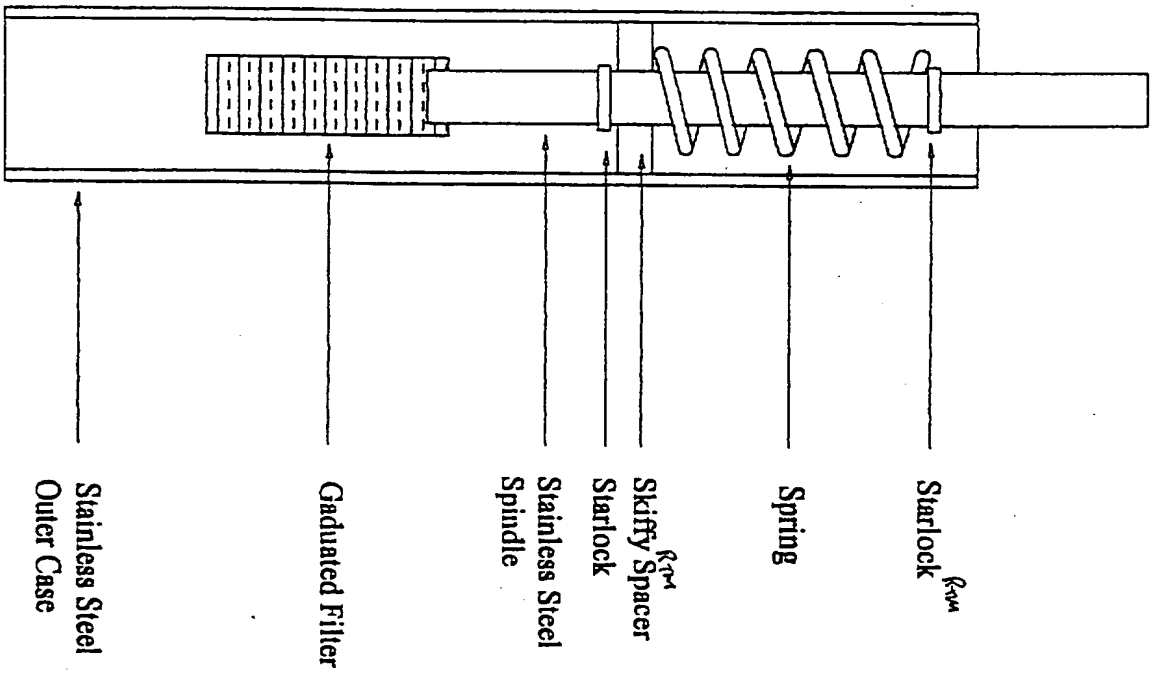
4. Spring



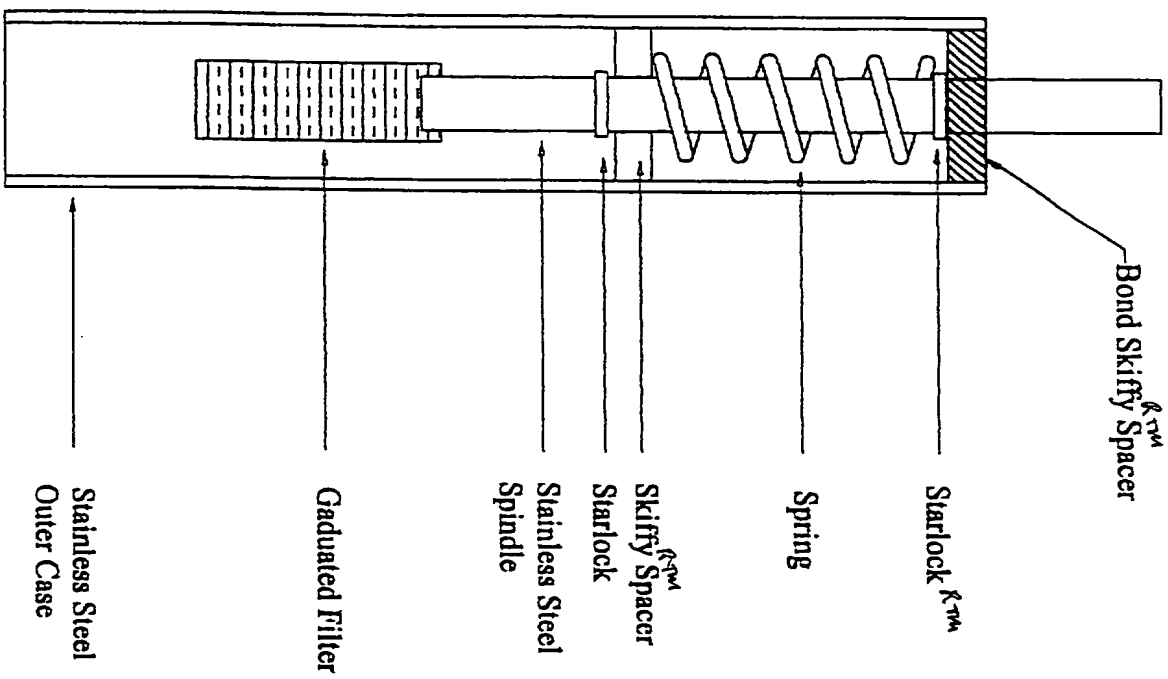
TR 1 Assembly Sequence Part 1



TR 1 Assembly Sequence Part 2

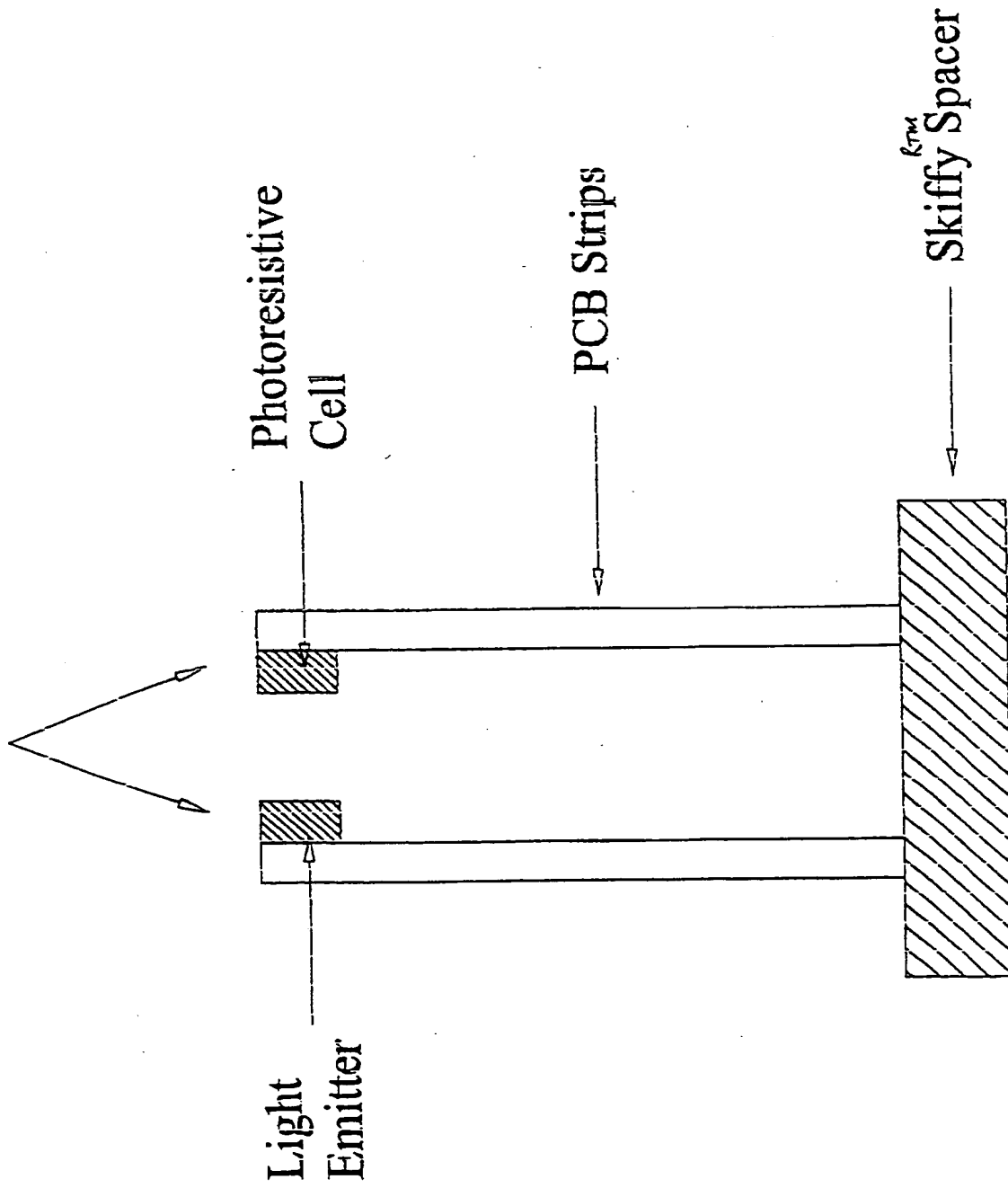


TR 1 Assembly Sequence Part 3

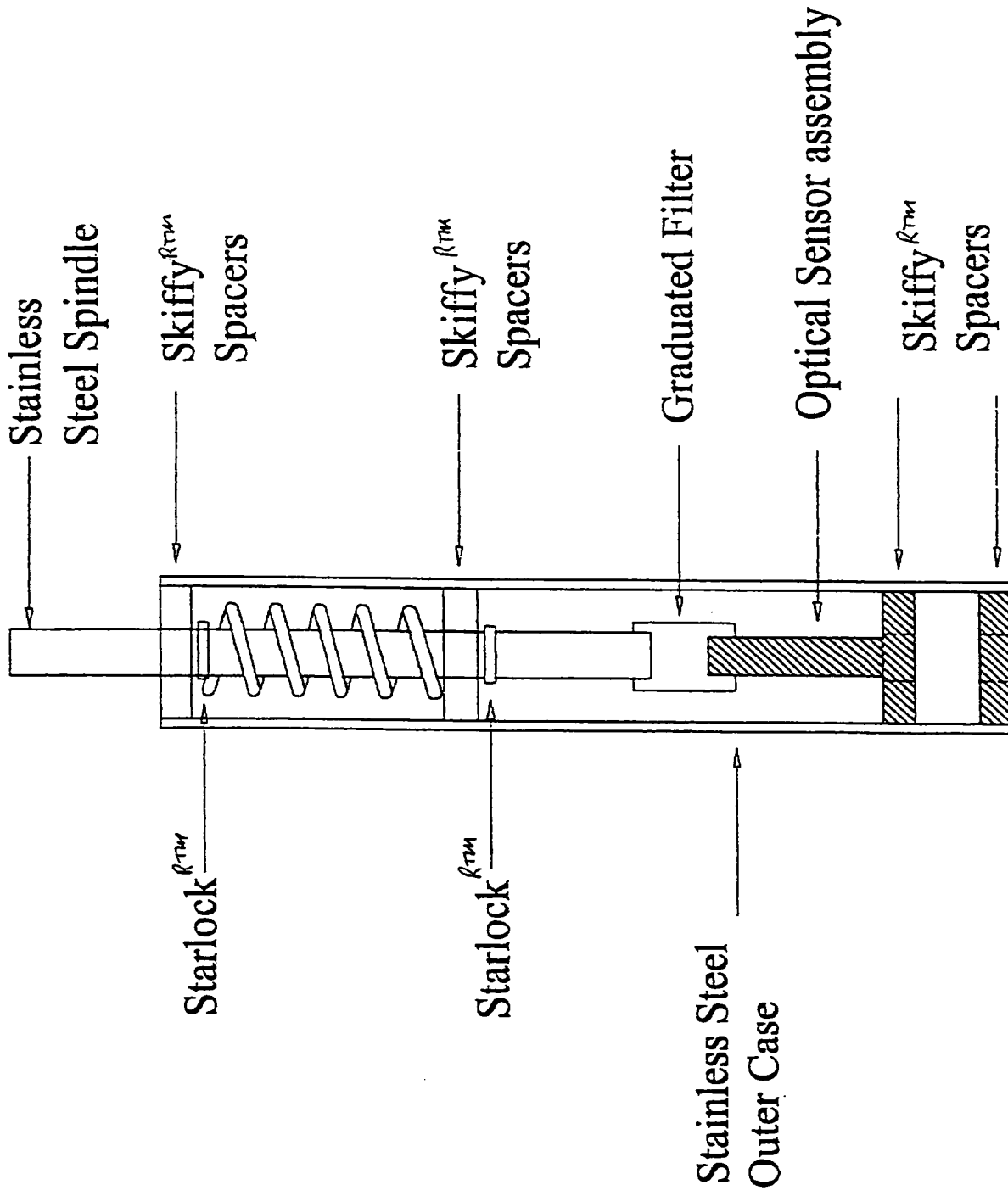


TR 1 Assembly Sequence Part 4

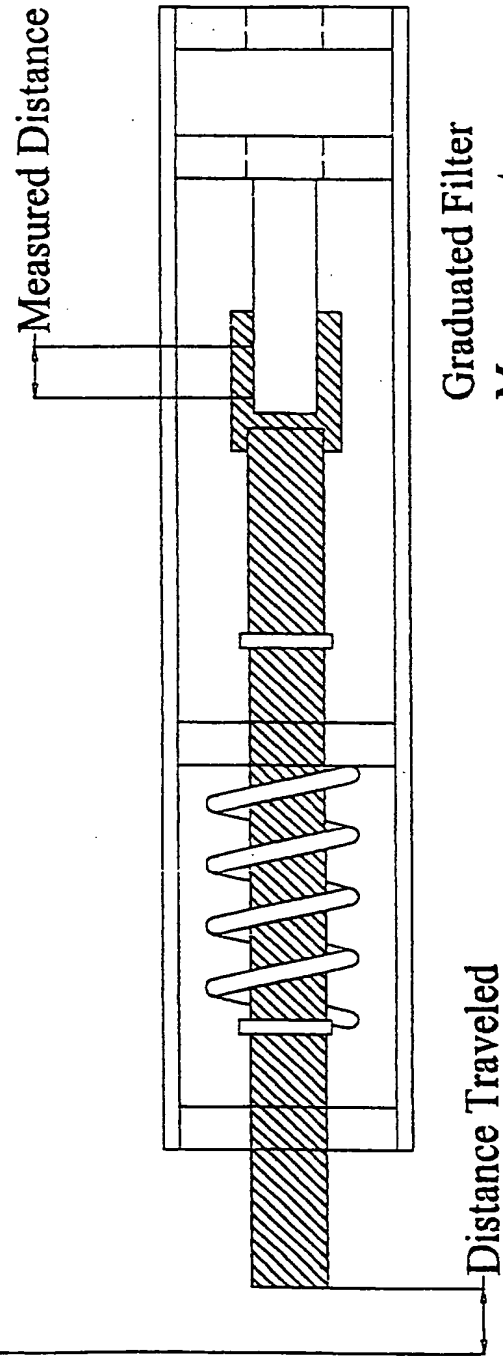
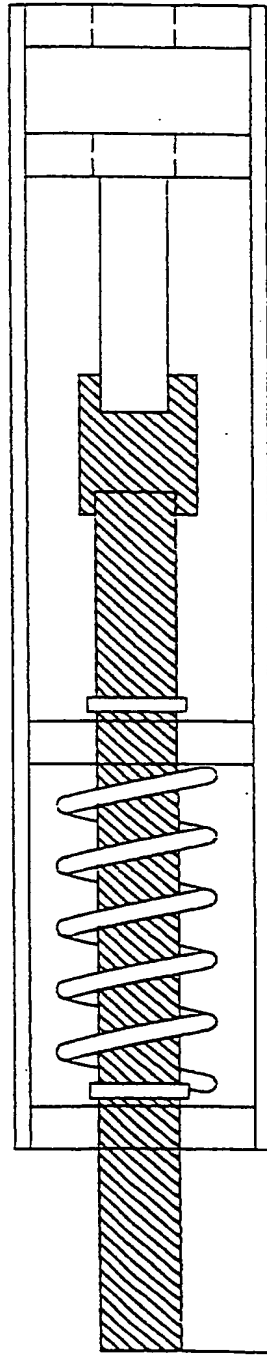
# Surface Mount Technology



TR 1 Assembly Sequence Part 5



TR 1 Assembly Sequence Part 6



Graduated Filter  
Measurement

TR 1 Assembly Sequence Part 7

## Optical linear transducer

### Description of Optical Transducer

The Optical Transducer has been designed from stainless steel and plastic, as most of the intended applications will be exposed to the elements. High temperature cable can be fitted to allow use in a wider range of conditions.

### Intended Applications

The intended applications will vary depending upon the user.

Some uses are: -

Measuring stress movements in bridges

Road surface movement in diverse weather

Movement in structures during and after construction

### How it operates

Using part 7 drawing as a guide the outer case is attached to a fixing point relevant to the user, with the spindle gently pressing against the surface to be monitored.

When the surface moves, the spindle is forced into the outer-case moving the graduated filter between the photo-resistive cell and the light source. The intensity of the light changes and the photo-resistive cell monitor's a change.

This change can be seen as a plus or minus reading in ohms on a digital meter.

To calculate the distance travelled a maximum compression reading is made and then divided by the maximum distance travelled. This will give an accurate and reliable linear scale. One of the benefits of this method of measurement is the transducer can be monitored from a great distance and the transducer can be turned off without fear of resetting itself when switched back on.

The transducer has a graduated filter mounted on top of a spindle. When the spindle is subjected to any pressure the graduated filter will pass between a light source and a photo resistive cell. As the light intensity changes the photo resistive cell will register a change. This change can be seen as an increase or decrease in ohm's on an analogue or digital meter.

A spring is fitted inside the stainless steel tube around the stainless steel spindle, which supplies a positive pressure to the movement of the transducer.

ClaimsLinear Optical Transducer

1. A transducer that operates in a linear axis that measures distance of movement, when spindle depressed.
2. A transducer as claimed in claim 1 where the distance is determined by the graduated filter moving between a light source and a photo resistive cell.
3. A transducer as claimed in claims 1 and 2 where the resistance in ohms can be converted into distance
4. A transducer as claimed in any preceding claims which is made of metal and plastics that withstand extreme temperatures



INVESTOR IN PEOPLE

Application No: GB 0010015.6  
Claims searched: 1

3

Examiner: Bob Clark  
Date of search: 3 August 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): G1A (AEW)

Int Cl (Ed.7): G01D 5/32, 5/34

Other: Online: EPODOC, JAPIO, WPI

### Documents considered to be relevant:

| Category | Identity of document and relevant passage                    | Relevant to claims |
|----------|--|--------------------|
| A        | GB 2245973 A (KOUDIS) Whole document                         |                    |
| A        | GB 2173898 A (CEGB) Lines 55 to 127 page 1                   |                    |
| X        | US 5420413 (FIELDS) Line 6 column 3 to line 49 column 4      | 1-4                |
| X        | US 5386291 (SATO) Whole document                             | 1,2                |
| X        | US 5376785 (CHIN) The embodiments of figures 2-5, 14 and 24. | 1,2                |
| X        | US 5329114 (FIELDS) Line 44 column 2 to line 26 column 4     | 1-4                |
| X        | US 5017771 (BARTHOLOMEW) Line 4 column 3 to line 44 column 4 | 1-4                |
| X        | US 4572607 (KRIZIK) Whole document                           | 1,2                |

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.